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**REPORT TO COUNSEL
CONCERNING
INJURY TO AMANDA ARNOLD**

Project No. 3565

2 February 2018

By

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I. INTRODUCTION

On 3 May 2017, Shannon M. Pennoek, Esq. of Pennoek Law Firm LLC of New York and New Jersey, contacted Charles R. Cushing, Ph.D., P.E. of the naval architecture and marine engineering firm of C. R. Cushing & Co., Inc., New York, N.Y. Ms. Pennoek requested technical assistance and possible trial testimony in a case involving Ms. Amanda Arnold, the Plaintiff, and her injuries aboard the ferry M/V EAGLE.

The plaintiff Ms. Arnold is represented by the Pennoek Law Firm.

Clinton & Muzyks, P.C. of Boston, M.A. represents the defendant Woods Hole, Martha's Vineyard and Nantucket Steamship Authority ("SSA"). This case is being heard in the United States District Court for the District Court of Massachusetts, Civil Action 17-10432-JGD.

This case is C. R. Cushing & Co. Project No. 3565. The opinions expressed in this report are based on documents provided by defendant's counsel and independent research and are listed in Appendix A. These opinions are also based on the education, training and experience of C. R. Cushing and are listed in Appendix B.

Dr. Cushing reserves the right to amend this report in the event that new information and evidence is provided.

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II. BACKGROUND

On Friday, 30 September 2016, Ms. Amanda Arnold of New York, N.Y., was a passenger aboard the ferry SSA's M/V EAGLE. She was accompanied by her brother, Patrick Arnold. The vessel was en route from Hyannis to Nantucket.

At approximately 1618, Ms. Arnold was exiting the women's public restroom on the port side of 02 Deck, forward on the vessel. The heavy metal interior door slammed close on her right hand, nearly severing two of her fingers.

Ms. Arnold was assisted by the purser and two passengers, a doctor and a nurse. When the vessel docked at about 1700 hours, an ambulance was called, and Ms. Arnold and her brother were taken to a hospital in Nantucket. An accident report was prepared by the SSA Pilot/Mate Stephen Pollit and is dated 9-3-16. He describes Ms. Arnold's accident as "restroom door closed on two fingers" and "2 fingers cut bad." According to the deposition of Purser Healy who was on the M/V EAGLE that night, it was Purser Healy that prepared the accident report and attended to Ms. Arnold when she was injured.

According to the vessel's logbook at about 1445 hours on 10 September 2016, the wind was easterly force 6-7, and overcast. The wind over the region was NNE'ly. The current was ebbing. Captain P. Hennesy was in command of the vessel. Pilot/Mate Stephen Pollit was on board, standing the second watch (1414 to 2240 hours). The purser on duty was S. Healy.

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III. THE DOOR

The 02 Deck centerline passageway extended from the officer's quarters, forward to the public lounge at the after end of the 02 Deck. The door to the women's restroom was on the port side of the centerline passageway. The 02 Deck Women's Restroom was door Number 02-11 on the SSA door numbering system and No. 34 on the Dean Steel joiner door schedule. It opened inward from the passageway, into the restroom. It was a United States Coast Guard approved Class A fire door. It was a right-handed door, meaning that when facing the door from the passageway, the hinges were on the left and the door handle on the right.

The metal door measured 37 1/2 inches wide by 78 1/2 inches high. It reportedly weighed 190 lbs. The door was 1 3/4 thick. The door was manufactured by Dean Steel Co. of San Antonio, Texas. On 26 July 2017, Capt. Griffin/Gifford #1814 put in a work order to replace the A-60 fire doors on the women's and men's restroom with a "lighter, less heavy door" (work order 4339260). The work was never done. The door is fitted with three 345-type hinges. The door is fitted with a DORMA door closer that is supposed to automatically retard the door closing rate. The door is fitted with a DORMA Model 8616 door stopper (closer) to prevent the door from slamming.

46 CFR Part 39 ferries and passenger vessels operated by public entities are covered by ADA. ADA Standards 404.2.8.1 state that door closers which retard the door closing motion shall be adjusted so that from the open position of 90 degrees, the time required to move the door to a position of 12 degrees from the latch is 5 seconds minimum. American National Standards Institute (1cc A117.1-2009) in Section 404.2.7 closing speed has the same requirement as ADA.

Opposite the door, five feet across the passageway was a fore-and-aft, horizontal pipe handrail affixed to the starboard passageway bulkhead. However, along the passageway bulkhead where the door opening to the women's public restroom was fitted, there was no handrail.

The door was opened from the corridor by turning a levered handle and pushing the door inward. From inside the restroom, the door was opened by turning the inside levered handle and pulling the door open.

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The door was fitted with a hook-type hold back. At the time of the accident, the door was not hooked open. In approximately 2011 a replacement door closer was installed. The DORMA closer is a Model 8616, adjustable for interior doors. It is certified by ANSI/BHMA A156.4 Grade 1; UL and CUL listed and is advertised to meet UL 1 OC for positive pressure and supposedly meets ANSI/BHMA A117.1 and ADA for barrier free accessibility CSFM approved. Most of the door closers on the EAGLE were DORMA.



Fig. 1 – Entrance to Women's Public Restroom, Looking to Port and Forward. Note Absence of Handrail.

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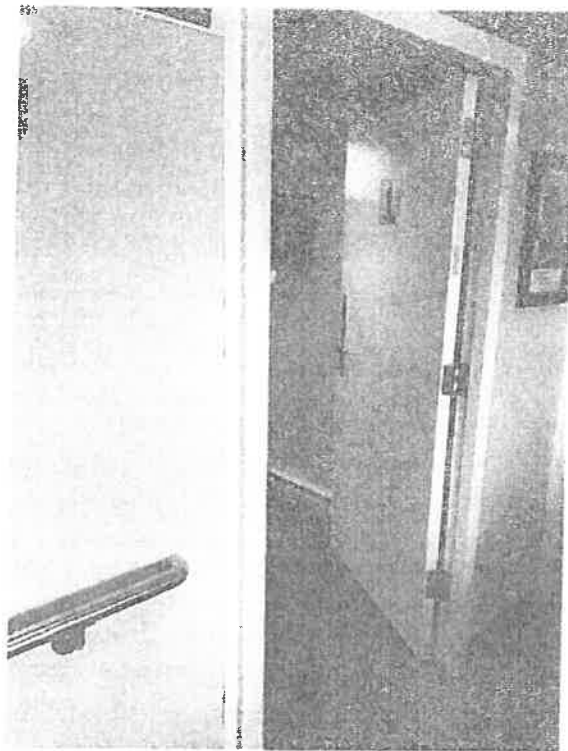


Fig. 2 – Entrance to Men's Public Restroom. Note Handrail.



Fig. 3 – DORMA Door Closer.

The closer has adjustable spring power and backcheck positioning adjustment. The adjustable backcheck takes effect when approximately 70° closed. The closer has adjustable hydraulic values to control latch closing speeds, which is to assure an effective ANSI backcheck range.

The door closer imparts a force of the door against the door jamb. The American Disabilities Act (ADA) requires that the door opening force not exceed 5 lbs. The American National Standard (ANSI) requires that the force not exceed 5 lbs.

The door closer is spring operated. The spring settings are adjustable from 1 to 6. When shipped from the factory, the setting is 4, according to the DORMA 8600 specifications. The door closure to the women's restroom was installed in 2011. There is no evidence that it was ever adjusted or the spring setting changed prior to the time of the accident.

On 29 December 2017, the undersigned boarded the M/V EAGLE together with the plaintiff attorney S. Pennock and plaintiff door expert Mr. Panish to examine the subject door and take measurements. When tested, the subject door slammed closed with a

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force of 126 lbs. The door closed from its fully open position to its closed position in 1.5 to 2.0 seconds. The door closer was clearly not functioning or seriously out of adjustment. In effect, the door was slamming closed. At the handle edge of the door, the door was striking the jamb with a force in excess of 120 lbs.

The door failed to meet standards for two reasons. First, the closer did not retard the motion of the door. Second, with the 190-lb. door slamming closed, the force on the jamb was order of 120 lbs. Therefore, the door would require more than 5 to 15 lb. force to open it against the closing force. Further, the test on the door carried out on 29 December 2016 occurred at the dock, in calm water. If the EAGLE had been in a seaway in blustery weather and rolling such as on 30 September 2016, rather than at the dock, the unrestrained door would have slammed even faster and with greater force.

The work order records for the M/V EAGLE indicate that inspections of all door closers were ordered between 2006 and 2016 only four times (2007, 2011, 2014 and 2016) in spite of the fact there were numerous repairs and adjustments made to DORMA door closers during this time.

There is no record in the maintenance system that the inspection of the door closers ordered on 13 January 2016 was ever carried out. There was no start or completed date recorded in the maintenance system.

Door closers are essential to the safety of the vessel and personnel and passengers, especially fire doors. The purpose of fire doors is to isolate various compartments and prevent the spread of fire and toxic smoke. Therefore, fire doors are not to be left open or ajar. Door closers assure that the doors are always closed. A second important safety reason for door closers is to retard or regulate the closing rate of the door. If the door closes too quickly, it is possible that a person may be struck by a slamming door. Hands and fingers are put especially at risk by a slamming door. In ships such as the EAGLE, subject to rolling in a seaway, an unrestrained door (without a functioning door closer) will always slam with great force. For these reasons it is essential for the safety of passengers and the ship that fire doors and door closers are well maintained, kept in adjustment and are inspected and tested frequently.

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The manufacturer of the DORMA door closers, in their product information and safety advice state:

"Under conditions of normal usage however, the company considers that at least an annual inspection, test and maintenance schedule be carried out as follows:

Inspection of safety relevant components of the door closer system and its accessories to determine continued safety of fixings and the extent of any wear which may have taken place.

Checking of the closing speed and any other hydraulic functions and adjusting the setting if required.

Lubrication of relevant moving parts including the door hinges and latch.

Checking for ease of door operation.

Checking of special accessories particularly hold-open devices whether or not electro-mechanical in operation.

Replacement parts as necessary using *only parts/components manufactured or approved by the Company.*"

The DORMA advice states that:

"During maintenance work specialist organizations should ensure that only safe and suitable cleaning agents are used which contain no corrosive or damaging constituents likely to damage components of the door closer system"

and

"If a door closer system shows signs of malfunction a competent specialist organization should be called in to perform the necessary checks and component replacement."

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The recommendation of DORMA and NFPA regarding maintenance and frequency of inspections are even more important for installations onboard ships. The door closers on the EAGLE operate in a salty, corrosive atmosphere. The closers are subject to the constant rolling and other motions of the vessel.

The National Fire Protection Association (NFPA) Standard 80 for Fire Doors Other Opening Protectives requires that:

5.2.1 Fire doors assemblies shall be inspected and tested not less than annually, and a written record of the inspection shall be signed and kept for inspection.

5.2.3.1 Functional testing of the fire door and door assemblies shall be performed by individuals' knowledge and with an understanding of the operating components of the type of door subject to the testing.

A review of SSA fleet maintenance work orders indicates that for the M/V EAGLE, between 8 September 2006 and 23 September 2016, a period of 10 years, such annual inspection was ordered only 4 times, namely on:

29 April 2007

30 September 2010

12 March 2014

13 January 2016

This is an average of every two and one-half years, not annually. No written certification that such inspections took place.

The frequency of maintenance and repairs to door closers as shown in the work orders would indicate to anyone involved with maintenance aboard the EAGLE that the closers require constant care and inspection. However, Carl Walk testified that there was no routine preventive maintenance carried out on the door closers.

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A review of the work order details indicated that in many cases, there was a considerable delay in the execution of repairs to doors and closers, assuming that the SSM company wide MAXIMO maintenance system is correct, for example:

<u>Order No.</u>	<u>Task</u>	<u>Date Ordered</u>	<u>Date Completed</u>
4161089	Repair Broken Closer	29 Dec. 2015	10 May 2016
4153738	Correct Delay in Door Movement	31 Oct. 2015	10 May 2016
4139645	Repair Men's Restroom Door	27 Jul. 2015	10 May 2016
4124361	Repair Door Closer	5 Apr. 2015	10 May 2016
4122820	Adjust Door Closer	24 Mar. 2015	Not Completed
4122023	Repair Door Closer, 2 nd Reg.	18 Mar. 2015	Not Completed
4108849	Repair/Adjust Door Closer	5 Dec. 2014	10 May 2016
4106297	Repair Women's Stall Door	19 Nov. 2014	10 May 2016
4099592	Repair Broken Door Closers	4 Oct. 2014	26 May 2016
4094375	Renew Door Closer	10 Sept. 2014	10 May 2016
4092292	Fix Closer	20 Aug. 2014	23 May 2016
4086001	Replace Door	15 July 2014	26 May 2016
4046378	Replace Door Closer, 2 nd Reg.	22 Dec. 2013	20 Mar. 2014
4045592	Repair Door Closer	19 Dec. 2013	20 Mar. 2014
4035785	Adjust Door Closer	22 Nov. 2013	20 Mar. 2014
3986975	Repair Door, Closes Too Fast	15 May 2013	26 May 2016
3979641	Repair Door Women's Head	8 Apr. 2013	26 May 2016
3978535	Repair Door Closer	31 Mar. 2013	26 May 2016
3204303	Repair Door Closer	5 Aug. 2012	10 May 2016
2613496	Inspect All Door Closers	30 Aug. 2011	Not Completed
2334663	Inspect...Closers...Failing Constantly	24 Aug. 2011	Not Completed
2222908	Replace Door Closer	22 Jul. 2011	3 Sept. 2014
2054219	Replace Door Closer	28 May 2011	23 May 2016

The above examples show that annual inspections, maintenance and repair to doors and closers were sometimes delayed months or even years.

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IV. WEATHER AND VESSEL MOTION

The M/V EAGLE, and any vessel floating in a seaway is subject to six degrees of freedom. This means that it can translate in three different directions. It can SURGE (move ahead or astern, fore-and-aft). It can SWAY (move side to side). It can HEAVE (move up and down). These are linear motions. The vessel can also move in three different rotary motions. The vessel can ROLL about a longitudinal axis. It can PITCH around a horizontal axis. It can YAW about a vertical axis.

These six different motions do not occur at regular intervals but can be intermittent and sometimes combine to create a very unsteady platform. The six different motions may occur simultaneously. Usually rolling is the most significant motion. Persons on a moving ship must steady themselves against these motions. These motions can be large and unexpected.

The ferry route from Hyannis, across Nantucket Sound to Nantucket is across open, unsheltered water. The approximately 24 statute mile route is in a 155°T SSE'ly direction. On the 30 September trip where plaintiff was injured, the port side of the M/V EAGLE would have been open to the Atlantic Ocean.

The weather reports at the Nantucket airport, Cape Cod United States Coast Guard (U.S.C.G.) air station and Martha's Vineyard all give wind direction at 1600 hours as ENE'ly direction. This means that the wind and seas would have been on the vessel's port beam. This wind direction was confirmed by the vessel's Deck Logbook¹.

The maximum wind at these land stations was between 23 and 26 mph, with gusts up to 34 mph. These are based on land reports. The Beaufort Scale, which is normally used by mariners describes wind of 25 to 31 mph as a Force 6 "strong breeze" and sea state "rough." However, the Deck Log on the vessel gave the wind at 1445 hours as Force 6-7. The observations in the open seas are likely more accurate. A Force 7 is rated on the Beaufort Scale as "near gale." The seas are described as "very rough."

Therefore, the EAGLE at this time of the accident would have been experiencing strong winds and waves on its port side. In addition to rolling, the gusting wind creates what is

¹ The vessel's Deck Logbook indicates that at 1445 hours, wind was Force 6-7, NNE'ly and the weather was overcast. The tide was ebbing.

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called "wind heel." The vessel additionally lists or leans over to starboard under the force of the wind gusts.

Similarly, the waves would have been striking the vessel on its port side, causing the vessel to roll from port to starboard and back. The angle of roll is a function of the vessels metacentric height and other factors. The average rolling period would be very approximately 13 seconds, meaning that the vessel would take about 13 seconds to make one complete roll from one side to the other and back.

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Beaufort number of force	Wind speed			World Meteorological Organization (1983)	Effects observed in, from, and on	Estimating wind speed		Sea state
	Knots	mph	meters per second			Effects observed near coast	Effects observed on land	
0	under 1	under 1	0.0-0.2	Calm	Sea like mirror	Calm	Calm, smoke rises vertically	0 Calm, glassy
1	1-3	1-3	0.3-1.5	Light air	Small waves, crests of glassy appearance not breaking	Fishing smoke just has streaks way	Smoke drift indicates wind direction, waves do not break	1 Calm, glassy
2	4-6	4-7	1.6-3.3	Light breeze	Large waves, crests begin to break, noticed whitecaps	Waves fill the side of smoke, which then laves at about 1-2 miles per hour	Wind left on face, leaves smoke, smoke begins to move	2 Small, choppy, glassy
3	7-10	8-12	3.4-5.1	Gentle breeze	Small waves, breaking longer, numerous whitecaps	Smoke begins to curve and travel about 1-2 miles per hour	Leaves, small twigs in constant motion, light flag extended	3 Smooth, wavelets, glassy
4	11-16	12-16	5.5-7.7	Moderate breeze	Moderate waves, taking longer from crest to trough, many whitecaps	Smoke begins to curve and travel about 1-2 miles per hour	Dust, leaves, and loose paper raised up, small branches move	4 Slight ripples
5	17-22	19-24	8.6-10.7	Refreshing breeze	Larger waves forming, whitecaps everywhere, more spray	Smoke remains in harbor and above sea level	Small trees in leaf begin to sway	5 Rough, glassy
6	23-27	26-31	10.6-13.8	Strong breeze	Sea begins to whip from front, breaking waves begin to break into spray, marked streaks	All smoke made for harbor, if near	Larger branches of trees in motion, twigs lead in wind	6 Very rough, glassy
7	28-34	32-38	12.7-17.1	Very strong breeze	High waves, sea begins to roll, dense white spray may reduce visibility	Smoke made for harbor, if near	Whole trees in motion, resistance felt in walking against wind	7 High, glassy
8	35-42	40-48	15.7-20.7	Gale	Very high waves with overhanging crests, sea takes white appearance as foam is blown in very dense streaks, rolling is heavy and visibility reduced	Smoke made for harbor, if near	Swag and small houses broken off trees, structure generally toppled	8 Very high, glassy
9	43-50	50-58	20.0-24.4	Strong gale	Very high waves with overhanging crests, sea takes white appearance as foam is blown in very dense streaks, rolling is heavy and visibility reduced	Smoke made for harbor, if near	Slight structural damage occurs, state of trees from tops	9 High, glassy
10	46-55	53-62	24.5-27.4	Storm	Exceptionally high waves are covered with white foam, patches, visibility still more reduced	Smoke made for harbor, if near	Sudden structural damage occurs, trees broken or uprooted, considerable structural damage occurs	10 High, glassy
11	56-63	64-72	27.5-32.0	Violent storm	Air filled with foam, sea completely white with driving spray, visibility greatly reduced	Smoke made for harbor, if near	Very rarely experienced on land; usually accompanied by widespread damage	11 Very high, glassy
12	64-81	73-86	32.7-39.0	Hurricane				12 Very high, glassy

Note: Since January 1, 1983, weather map symbols have been based upon wind speed in knots, at five-knot intervals, rather than upon Beaufort number.

Fig. 4 - Beaufort Wind Scale. American Practical Navigator.

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Fig. 5 – Route of Ferry M/V EAGLE Between Hyannis Port and Nantucket.

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V. THE VESSEL

The characteristics of the vessel are as follows:

Vessel Name	M/V EAGLE
Official No.	910026
IMO No.	8705864
Builder	McDermott Shipyard, Morgan City, LA
Hull No.	278
Date Delivered	7 December 1987
Length Overall	213 feet
Length Waterlines	2196 inches
Draft Design	12'2 inches
Beam	61 feet 6 inches
Gross Tonnage	397 GRT
Net Tonnage	270 NRT
Deadweight Tonnage	522 LT
Owner	Woods Hole, Martha's Vineyard and Nantucket Steamship Authority, Commonwealth of Massachusetts
Rating	Lakes, Bays and Sounds
Passengers	799 (755 per vessel systems and training manual)
Crew	10
Others	7
Total	816
Propulsion	Diesel (2 EMD12-645-6)
Power	3000 BHP
Speed	15 knots

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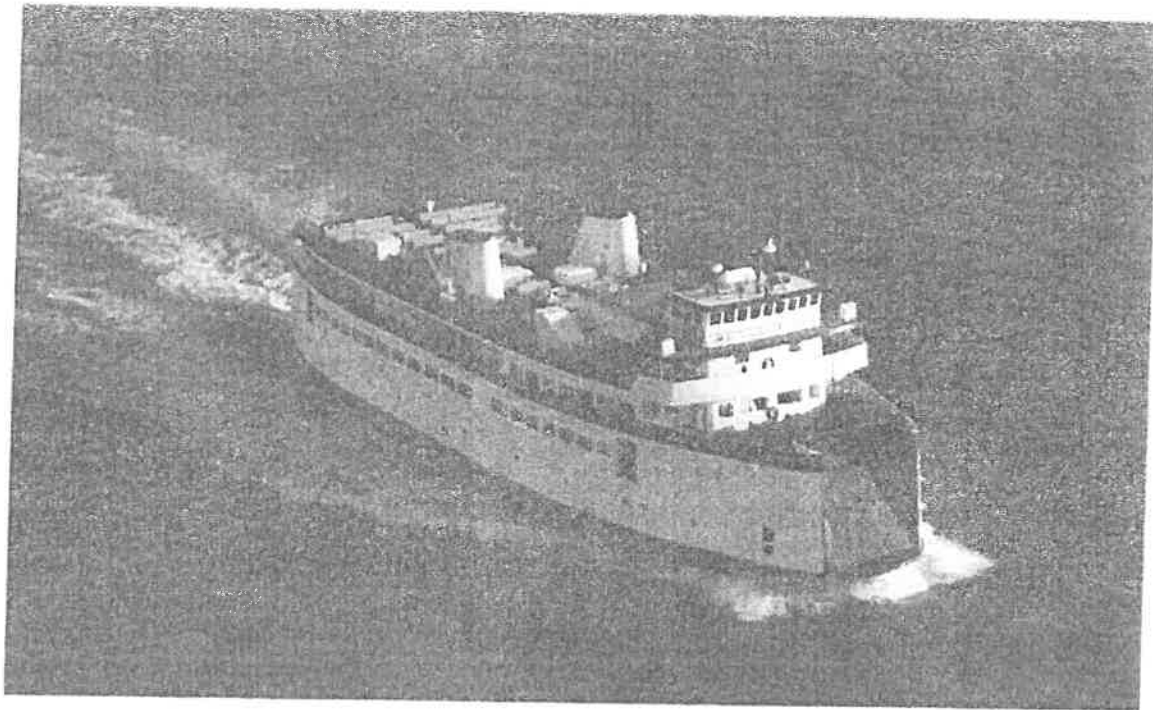


Fig. 6 – M/V EAGLE

SSA operates year-round ferry service for over 3 million passengers and vehicles on two routes, namely between Woods Hole and Martha's Vineyard and the other between Hyannis and Nantucket.

The motor vessel EAGLE is a 30-year old, steel hulled, car and passenger ferry operating between Woods Hole Massachusetts and Nantucket/Martha's Vineyard.

The lowest deck is the Main Deck, arranged for drive-on vehicles. The deck above the Main Deck is the 01 Deck and is only a partial deck outboard of the vehicle spaces. The deck above, the 02 Deck, is outfitted with passenger seating, a concession-stand and public restrooms for passengers. The 03 Deck is an open deck with passenger benches and crew quarters forward. Above the 03 Deck is the Navigation Bridge.

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VI. HANDRAILS

U.S.C.G. regulations require handrails on both sides of interior corridors that are 72 inches or wider. The centerline corridor, outside the women's restroom on the EAGLE, is 60 inches wide and while there is a handrail on the bulkhead outside the men's restroom, unfortunately there was none outside the women's restroom (see photos).

The regulation, apparently, does not contemplate that on the EAGLE, the women's restroom would be used by the elderly, disabled and small children. Furthermore, when exiting the women's restroom, a passenger is moving in an athwartships direction and then must turn 90 degrees so as to move fore-and-aft. While exiting and turning, if the vessel is rolling to starboard, the handrail on the opposite bulkhead is more than 72 inches away, the passenger must hold on to the door jamb to prevent from lurching across the passageway. Then with the vessel rolling back to port, the passenger is thrown back against the rapidly closing door and must steady herself by grabbing the door jamb. There is no handrail to take hold of, the fact that the door was closing at a high rate of speed only exacerbated the problem. According to Ms. Arnold's deposition as she was exiting the bathroom, the boat rolled, and she was pushed against the wall and door jamb with the door closing in matter of a few seconds. Ms. Arnold was unable to react in such a short period of time. The plaintiff's action in reaching for the wall door jamb was only a natural reaction and not negligence. Good practice would dictate that there would be a handrail on both sides of the corridor.

The U.S.C.G. regulations are a "minimum" standard. There is nothing in the regulation to prohibit two sets of handrails.

The defendant alleges that at the commencement of the voyage, the vessel's purser warned over the intercom that the vessel is subject to rolling and pitching and that passengers should be using the handrails. Also, that doors may close suddenly. The safety poster shows that passengers should use the handrails.

The safety warning in the Steamship Authority's 19 April 2006 memo regarding the safety announcement cautions that "when entering or exiting through doorways watch that the wind does not catch the door and pull it out of your hand." This warning

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applies to exterior doors. The subject door in this case was an interior door where there was no wind and would not have applied to this accident.

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VII. ACCIDENT REPORTS

The defendant provided twenty SSA Personal Injury Reports covering the period of 14 July 2011 to 6 September 2017, including that of plaintiff. In a period of 6 years, there were 20 accidents relating to doors closing on fingers. This is an average rate of three finger accidents 3.66 injuries per year. Such a high rate would suggest that injuries to fingers from closing door should have been a cause for great concern and high priority for SSA. The majority of these reports appear to be reportable to the U.S.C.G.

There were some disturbingly similar accidents to the plaintiff. For example:

1. 20 November 2011, a passenger was exiting the women's restroom, in rough sea conditions, she steadied herself on the door frame and the door (No. 2-11) "slammed" on her right-hand thumb.
2. On 29 June 2012, a girl exiting the women's restroom, the vessel was "rolling side to side," and the door (No. 34) closed on her hand injuring two fingers. If the ship was rolling, it is unlikely that the railing on the opposite bulkhead would have been an aid to her.
3. On 23 December 2012, "my daughter went to the women's restroom and got her finger stuck in the door."
4. On 7 April 2015, while a female passenger was leaving women's restroom she caught her thumb in the restroom door.

There may be other similar cases but some of the reports are too vague to make a direct comparison. Nevertheless, it is clear from the proportionately large number of door accidents to fingers that this was a serious problem and required the attention of management.

Regarding accident reports, it is a U.S.C.G. regulation (46 CFR Ch. 1, Subpart 4.05) that Notices of Marine Casualties be reported to the nearest Sector Office, Marine Inspection Office or U.S.C.G. Group Office, including injuries to persons onboard where the injury requires professional medical treatment beyond that of first aid. The fact that the purser, when presented with the injured plaintiff in his office made a general announcement asking for the assistance of any doctor, nurse or EMT personnel

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onboard, and that an ambulance was called to transport the plaintiff to the hospital indicates that the injury required medical treatment beyond first aid. There is no evidence or testimony that SSA complied with this regulation to make a formal report of the passenger injury to the U.S.C.G.

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VIII. DEPOSITIONS

The undersigned was provided with a number of depositions related to this case. Some of the issues were extracted from these depositions:

- A. Stephen Healy, M/V EAGLE Purser – Mr. Healy admitted that malfunctioning door closers can cause the door to slam. He was of the opinion that the rolling of the vessel may have had something to do with the accident.
- B. Captain Charles Gifford – SSA Port Capt. Gifford, the most senior marine manager at SSA, testified regarding the so-called SSA Operations and Safety Management Manual. He stated that it was outdated (21 years old) and was not really a safety manual and did not reflect company policy. It was merely a set of “guidelines” for masters aboard ship. It may be superseded by directives and memos. Contrary to the manual, there is no safety committee, per se, aboard the EAGLE. He does not receive copies of the minutes of the safety committee, since none are taken. Accident reports are sent to Human Resources/Personnel Department and he rarely sees them. When asked at deposition about “who is responsible for ensuring the effectiveness of the safety and environmental aspects of the quality system?”, he had difficulty answering because, he said, the safety manual was being updated.

When asked about handrails, the port captain testified that he was unable to answer the question that without handrails, passengers might end up grabbing for something else. He said he was unable to give an opinion on how passengers might react when the vessel was “rocking and rolling.” Notwithstanding, he prepared a safety memo to all captains, pilots and pursers that:

“As vessel crew it is sometimes easy to forget that many of the traveling public are non-mariners and it is also difficult to understand why they have a problem walking while it is rough.”

Capt. Gifford was unaware of the appropriate rate of door closing. He had not heard of any door closers not working properly. He was also unaware of any set

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schedule for the inspection of door closers (manufacturer recommendation and NFPA: annually).

- C. Vincent Tallino, SSA Carpenter – Mr. Tallino testified that he, in his shoreside position, gets most of the door and door closer Work Orders. He said that door closers are not repaired. When not working they are replaced. He was unaware of standards for maximum allowable resistance to door opening. He was also unaware of the minimum allowable rate of door closing. He did not know if the company had any such standards. He said that his assessment was that if the door slows down just before it latches, and it does latch, the closer is good. He admitted that a slamming door could hurt people. He also testified that he had not received any training concerning door closer and had not read the manufacturer's manual or recommendations concerning preventive maintenance.

His standard on door closing speed was just look at the closing door and subjectively rate it. He had no idea of the effect of the rolling of the vessel and how it would affect the door closing speed. He testified that neither he or others at SSA had training regarding DORMA closers. He was not aware of preventative maintenance done on the DORMA door closers.

- D. Carl Walker, Director of Engineering and Maintenance – Mr. Walker testified that there is no difference between routine and preventive maintenance. He testified that no work was done on the subject closer prior to September 2016 and it was working "fine" according to Capt. Corbett. Frank Tallino and other maintenance personnel gave the same answer. Mr. Walker felt that the door did not need maintenance to ensure safe closing speed because Captain Corbett and the maintenance personnel said no adjustment in speed was necessary. Neither he (Mr. Walker) admitted that they did not know what the safe speed was. Mr. Walker did not believe that there even were standards regarding closure speeds. He did not consult the DORMA manuals before the accident. He said the closers either work or don't work.

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- E. Phillip Parent, SSA director of Human Resources – Mr. Parent is familiar with U.S.C.G. requirements for the reporting injuries to passengers. However, that is the responsibility of the Port Captain/Marine Department. Mr. Parent says he reviews every accident report to see if something needs to be fixed. Mr. Parent makes decisions as to whether accident reports go to the Port Captain, Director of Engineering or not to send them. He gave as an example, a person should know not to put his hand in a closing door so therefore, the injury report needn't be sent to marine operations or engineering. The Director of Human Resources decides on the accident causation. If the report is incomplete, it is sent back to the originator. Capt. Gifford is responsible for U.S.C.G. reportable incidents. The Port Captain maintains copies of U.S.C.G. reportable injury reports.
- F. Captain James J. Corbett, Senior Captain, M/V EAGLE – Captain Corbett joined the EAGLE in 2011, prior to plaintiff's accident. He did not inspect the door to the women's restroom to see if there was anything wrong with it. When injuries occur on the EAGLE he is not made aware of them "per se." Capt. Corbett made the recommendation that restroom doors should be replaced with lighter doors, and the recommendation was denied. He testified that he had no opinion as to whether an improper functioning door can be a risk to passenger safety but agreed that doors that slam shut can injure people. Reportable accidents to U.S.C.G. are made out on Form 2692 and must be reported within 48 hours. They are first sent to the Port Captain, and by e-mail to the U.S.C.G. He testified that he was responsible to adhere to Federal Regulations including ADA.
- Capt. Corbett defined the EAGLE'S Safety Committee as "whoever is on watch at that time." The Safety Manual stated that the safety committee is to provide a forum to discuss specific safety concerns and provide feedback to the management safety committee (Port Captain, Director of Engineering, Director of Human Resources). Capt. Corbett testified that it was important in fulfilling his duties under the Safety Plan and ensuring the safety committee structure.
- Capt. Corbett explained one of the purposes of the closer is to control the rate of speed that the door closes, i.e. to prevent it from slamming. He did not believe that door closers are required by U.S.C.G. He seemed to be unaware that these

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are fire doors. When he inspects a door, he only subjectively judges that it closes too fast or too slow.

Capt. Corbett stated that the adjustment of door closers should be "done by a person who actually knows how to maintain and adjust a door closer device."

Capt. Corbett identified Mr. Tallino as that special door person.

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IX. OPINIONS

1. Plaintiff's accident and injuries were caused by short comings in the design, operations and maintenance of the M/V EAGLE and lack of maintenance.
2. The root cause of the accident was that the adjustable door closer on the women's restroom door was incorrectly adjusted. The mechanism on the door closer was set so as to cause the door to slam, rather than close slowly.
3. The door closers throughout the vessel were not regularly, formally or frequently inspected annually by persons with the knowledge and understanding of the operating components on the doors, specifically the door closers. Inspection of door closers were required to be inspected annually and a signed declaration of such inspection should have been made.
4. A major contributing cause for the plaintiff's casualty was the absence of handrails on the port side of the passageway. Handrails on one side of a passageway means that when persons are exiting a door and moving athwartships and must turn ninety degrees to move fore-and-aft, and at the same time the vessel is rolling, railings are needed on both sides of the passageway for passengers to stabilize themselves.
5. Plaintiff was not negligent in placing her hand on the door jamb. She was apparently attempting to stabilize herself, when the vessel was rolling, and the door was slammed. There was no second handrail in the centerline passageway to assist the plaintiff especially when the vessel is rolling.
6. The purser of the EAGLE had responsibility to report and relay any deficiencies, hazards or safety concerns with regard to the doors and their closers to the public restrooms to the attention of the master. He admitted that if the door closed too fast, it could injure a passenger. However, he did not know what too fast meant. He could not quantify what closing time represented door closer malfunction. He had received no training regarding door closers functioning, maintenance or inspection.

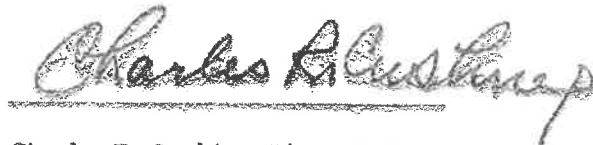
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7. There is no evidence that SSA used specialist organizations to inspect, test, adjust or maintain the door closers as recommended by the manufacturer.
8. SSA did not carry out an annual inspection and testing of the door closers as recommended by the manufacturer and required by NFPA, nor provided a written and signed record of the inspection.
9. The door closers on the EAGLE, the majority of which were DORMA door closers were a constant source of maintenance and were likely the cause of other accidents. The master should have alerted SSA Safety Management that closers required more attention and testing.
10. There is no evidence that SSA notified the U.S.C.G. of the plaintiff's injury even though required to do so by U.S.C.G. regulations.

I reserve the right to amend this report in the event that new material is provided. I hold all the above opinions to a reasonable degree of scientific certainty.

2 February 2018

Date



Charles R. Cushing, Ph.D., P.E.

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APPENDIX A

DOCUMENTS REVIEWED

1. Notice of Incorporation, United States Legal Document, Standard for Accessible and Usable Buildings and Facilities as mandated by law and incorporated by reference by the States and Municipalities, including Ohio in the Ohio Administrative Code 4401:8-44-01, ANSI ICC A117.1, 2009.
2. American National Standard for Door Controls – Closers, ANSI, Approved 28 May 2013.
3. U.S. Coast Guard, DHS, 46 CFR Subchapter H – Passenger Vessels.
4. Fire, Life Safety & Accessibility Codes, A Reference Guide for Doors & Hardware, Ingersoll Rand, Security Technologies, 2011.
5. NFPA 80, Standard for Fire Doors and Other Opening Protectives, 2007 Edition.
6. Ferry Transportation in Massachusetts, 4 October 2012.
7. DORMA Specifications from DORMA website.
8. Ship Inspection; Includes all photos and videos taken during the ship inspection on 29 December 17.
9. Defendant's Answers to Plaintiff's First Set of Interrogatories, Dated 09 August 2017.
10. Defendant's Response to Plaintiff's First Request for Production Dated 09 August 2017.
11. Defendant's Response to Response to Plaintiff's First RFPD Supplements:
 - a. 5 Safety Announcements, 2006-2016.
 - b. Arnold – EAGLE Door Maintenance Logs, 2006 to 2016.
 - c. Door Info, Maximo Handrail, and General Arrangement Plans: Door and Frame Schedule, Logs From 1 January 2006 to Present Relating to Handrail, and Vessel Arrangement Plan.
 - d. EAGLE Picture of Women's Restroom.

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- e. EAGLE Poster 1 & 2, Safety Poster.
- 12. Defendant's Rule 26(a)(1) Initial Disclosure, Dated 26 May 2017.
 - a. Incident Report Arnold accident report dated 30 September 2016.
 - b. Vessel Log, 30 September 2016.
 - c. Master Turnover Notes of incident, 30 September 2016.
- 13. Defendant's Interrogatories to Plaintiff, 26 May 2017.
- 14. Defendant's Requests for Production of Documents to Plaintiff, 26 May 2017.
- 15. Additional Discovery from Defendants; Post Response Disclosures:
 - a. Eagle 100116-090117 Doors: list of work logs relating to doors from 1 October 2016 – 1 September 2017.
 - b. Worker Logs that were requested sent on 08 November 2017.
 - c. Eagle-COI exp 031817: certificate of inspection on 18 March 2016.
- 16. FW requested logs and employees: Email in which defendants disclosed employee information on 08 November 2017.
- 17. Maintenance log index: A maintenance log index with employee ids, information, and pages they appear in on logs.
- 18. Defense Disclosures, 15 December 2017.
- 19. Vessel Operations & Safety Management Manual.
- 20. Vessel Systems & Training Manual.
- 21. Incident Reports (Redacted) All Vessels 2011-Present 15 December 2017.
- 22. Defendant's Supplemental Response to Request for Production No.17 30 November 2017.
- 23. Mason Group Videos, Eagle Video's 17 May 2017.
- 24. Video from Defense, 27 October 2016.

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25. Depositions:

- a. Ms. Amanda Arnold
- b. Capt. James Corbett.
- c. Capt. Charles Gifford.
- d. Purser Stephen Healy.
- e. Mr. Phillip Parent.
- f. Mr. Vincent Tallino.
- g. Mr. Carl Walker.

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APPENDIX B

CHARLES R. CUSHING, Ph.D., P.E.

Employer: C. R. Cushing & Co., Inc.
Naval Architects, Marine Engineers & Transportation Consultants
30 Vesey Street, 7th Floor
New York, New York 10007

Position: President

Degrees: B.S. (Marine Transportation), U. S. Merchant Marine Academy, 1956
B.S. (Naval Architecture and Marine Engineering), Massachusetts Institute of Technology, 1960
M.S. (Ocean Transportation), State University of New York, 1972
Ph.D. (Maritime Studies), University of Wales, Cardiff University, 1997
D.Sci (Hon.) World Maritime University, 2014

Experience:

C. R. Cushing & Co., Inc. is a firm of naval architects, marine engineers and transportation consultants founded in 1968 by Charles R. Cushing. Dr. Cushing has been responsible for the design, construction, and/or conversion of over 250 ocean-going vessels in most major shipyards in the U.S., Europe and the Far East.

Dr. Cushing has personally directed and/or executed the concept design, contract design, strategic planning, plan approval, supervision and construction of: tankers, tank barges, containerships, LNG ships, tugs, bulk carriers, roll-on/roll-off vessels, offshore pipe laying vessels, jacket delivery barges, passenger ships, and other types of vessels.

Risk analyses, safety audits, energy audits, corrosion studies, vessel maintenance, manning, collision avoidance, pollution prevention, navigation, coatings, automation, pumping, noise, vibration, hydrodynamics, and air quality monitoring typify the fields of Dr. Cushing's expertise.

Assignments ranging from port and terminal projects, economic analyses, material handling studies, marine operation and maintenance studies, automation studies, planned maintenance and repair systems all fall under his realm of expertise. He has been responsible for the design of numerous types of intermodal shipping containers; the purchase, inspection, and testing of containers, container refrigeration equipment, container chassis, and container handling equipment. He authored the *United States Coast Guard Tankerman's Manual*.

Dr. Cushing served as Chief Naval Architect at Sea-Land Service, Inc. from 1961 to 1968 where his accomplishments include the design and conversion of 45 containerships, the development of cranes and cargo handling systems. He holds a number of patents in maritime and intermodal technology.

Prior to his graduation from MIT, he sailed as a cadet and a licensed deck officer on a number of U.S.-flag general cargo and passenger vessels. He has been involved in cargo handling operations in the United States, South America, Southeast Asia, Australia, New Zealand, the Far East, Middle East, Africa, and Europe.

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Professional Associations:

American Bureau of Shipping, Naval Architecture Committee, Past Member,
 American Bureau of Shipping, Committee on Cargo Containers, Past Member
 American National Standards Institute MH5 Committee, Member 1961 to date
 American Society of Heating, Refrigeration and Air Conditioning Engineers, Member, No. 3031973
 American Society of Mechanical Engineers, Fellow, No. 261040 1956 to date
 American Society of Naval Engineers, Naval Member, No. 00549 1956 to date
 Charter Engineer, U.K., Engineering Council No. 152957
 EuroEngineer, European Union
 Global Maritime and Transportation School (GMATS), Founding Member, Board of Directors 1987 to 2012
 Institute of Marine Engineering Science and Technology, Fellow
 Instituto Pan Americano de Ingenieria Naval, Member IM-605
 International Cargo Handling and Coordination Association, Member
 International Standards Organization, TC-104, Past U.S. Delegate
 Japan Society of Naval Architects and Ocean Engineers, Member
 Korean Society of Naval Architects, Member
 Professional Engineer, State of Mississippi, Reg. No. 03537
 Lloyds Register of Shipping, U.S. Committee, Past Chairman; Technical Committee, Past Chairman
 Maritime Resource Center, Past Chairman
 MIT Club of New York, Member
 National Academy of Engineering – Elected 2004, Past Chairman Section 12, Past Chairman of Peer Committee
 National Academy of Sciences - NRC, Ship Structures Committee, Past Member
 National Academy of Sciences – Board of Army Science and Technology, Logistics Committee 2013 to 2014
 National Academy of Sciences - Navy Studies Board 2006 to 2014, Marine Board 2004 to 2010
 National Fire Protection Association, Member No. 105205
 National Shipbuilding Research Program, Blue Ribbon Panel Member, 2002 to 2015
 National Safety Council, Member
 New York City Port Council, Past Member
 New York Yacht Club, Member
 North East Coast Institution of Engineers and Shipbuilders, Past Member
 Nautical Institute, Member No. 98 12550
 Royal Institute of Naval Architects, Fellow
 Royal Institute of Navigation, Member
 Society of Maritime Arbitrators, Member
 Society of Naval Architects and Marine Engineers, Life Member, Fellow, No. 1080010
 SNAME Fellows Committee, Past Chairman, Finance Committee, Past Member, Ship Technical Operating Committee, Member
 Sperry Board of Awards, Chairman 1991/1992
 State University of New York (Maritime College), Engineering Advisory Committee, Member
 U.S.C.G., Chemical Transportation Advisory Board, Subcommittee on Bulk Terminals/Tank Vessels, Past Member
 U.S.C.G., SOLAS Working Group on Container Safety, Past Member and Past U.S. Delegate to IMO
 U.S. Naval Institute, Golden Life Member, 1956 to date
 U.S. Merchant Marine Academy, Foundation, Chairman, 1982 to 1986, Alumni Association, President, 1986-1990, Engineering Advisory Board, Past Member, Trustee, 2005 to 2007
 Webb Institute (Naval Architecture), Board Member; Emeritus Fellow; Executive Committee; Finance Committee; Chairman; Audit Committee; Planning Committee to 2010

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Honors and Awards:

The Admiral E.S. Land Medal for Excellence in Naval Architecture, USMMA, 1956
The Marine Man-of-the-Year, 1970, USMMA/SNAME
The Alumnus-of-the-Year, 1991, USMMA
Hall of Distinguished Graduates, 1991, USMMA
The International Maritime Hall of Fame, 2000
The Admiral E.S. Land Medal for Outstanding Contributions in the Marine Field, SNAME, 2000
Doctor of Science (Hon.) World Maritime University, 2014

Other Professional Activities:

- Authored numerous publications for professional societies, trade publications and industry conferences. Contributed chapters in the Society of Naval Architecture and Marine Engineers' *Ship Design* and *1993 Historical Transactions*.
- Authored several sections of Naval Studies Board publication *Responding to Capability Surprise: A Strategy for U.S. Naval Forces*, National Academies Press 2013 and *Mainstreaming Unmanned Undersea Vehicle into Future U.S. Naval Operations*, 2015.
- Authored several chapters of Board of Army Science & Technology publication *Force Multiplying Technologies for Logistics Support to Military Operations*, National Academies Press 2014.
- Authored *Marine Casualty Safety Investigation*, N.Y. 2013, ISBN 978-0-692-01994-8
- Adjunct Professor at World Maritime University in Malmo, Sweden, 1987 to date, teaching The Ship Acquisition Process and in Dalian, China teaching Maritime Accident Investigation, 2004 to 2014.
- Lectured at Massachusetts Institute of Technology, Webb Institute, University of Michigan, United States Merchant Marine Academy, Industrial College of the Armed Forces, Marine Engineers Beneficial Association, GMATS, WMU/DMU, and elsewhere.
- Serves as a director, officer or committee member of numerous educational, professional and industry organizations.
- Chairman, founder and principal shareholder in Oiltest, Inc.
- U.S. Naval Reserve, 30 years, retired 1982.
- Member National Academy of Engineering, elected 2004, Past Chair Section 12, Past Chair Peer Selection Committee.

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APPENDIX C

Publications by C.R. Cushing, Ph.D., P.E. In Last 10 Years

1. Cushing, C.R.; Chapter Author, *The International Handbook of Shipping Finance: Theory and Practice*, Chapter 4, Shipbuilding Finance, 2016.
2. Cushing, C.R.; Chapter Author, *Force Multiplying Technologies for Logistics Support to Military Operations*, Board on Army Science and Technology, National Academy of Science, Wash., D.C., 2014, contributing author.
3. Cushing, C.R.; *Marine Casualty Safety Investigation*; 2013, ISBN 978-0-692-0194-8.
4. Cushing, C.R.; Chapter Author, *Responding to Capability Surprise: A Strategy for U.S. Naval Forces*, Naval Studies Board, NRC, National Academies, Wash., D.C., 2013, contributing author.
5. Cushing, C.R.. *A Short Course on Marine Casualty Safety Investigations*, a presentation to the International Marine Forensics Symposium, National Harbor, MD., April 5, 2012.
6. Cushing, C.R. and Streb, B., *Forensic Investigation of a Possible Barge Allision with a Floodwall During Hurricane Katrina*, a presentation to the International Marine Forensics Symposium, National Harbor, MD., April 4, 2012.

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APPENDIX D

Testimony Given Last Four Years
By Charles R. Cushing Ph.D., P.E.

PROJECT No. 3526
Name of Project – Buty, Curliano – Bellopede Asbestos
Client – Buty & Curliano LLP
Date: January 12, 2017
Deposition Testimony

PROJECT No. 3365
Name of Project – Lafarge – Katrina II
Client – Goodwin Procter, LLP
Date: October 28, 2016 & November 18, 2016
Deposition Testimony

PROJECT No. 3475
Name of Project – Bishop, Barry – Booth Asbestos
Client – Bishop Barry
Date: October 20, 2016
Deposition Testimony

PROJECT No. 3479
Name of Project – Bishop, Barry – Heath Asbestos
Client – Bishop Barry
Date: February 24, 2016
Deposition Testimony

PROJECT No. 3460
Name of Project – Miles & Stockbridge – Sroka Asbestos
Client – Miles & Stockbridge, P.C.
Date: January 15, 2016
Deposition Testimony

PROJECT No. 3398
Name of Project – Mouledoux, Bland – Hall Asbestos
Client – Mouledoux, Bland, Legrand & Brackett
Date: October 29, 2015
Deposition Testimony

PROJECT No. 3445
Name of Project – Hugo, Parker – Walashek Asbestos
Client – Hugo Parker LLP
Date: October 2, 2015
Deposition Testimony

PROJECT No. 3396
Name of Project – Preg, O'Donnell – MOL COMFORT Arbitration Sinking
Client – Preg, O'Donnell & Gillett LLP
Date: June 3, 2015
Deposition Testimony

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PROJECT No. 3396

Name of Project – Preg, O'Donnell – MOL COMFORT Arbitration Sinking

Client – Preg, O'Donnell & Gillett LLP

Date: May 6, 2015

Deposition Testimony

PROJECT No. 3396

Name of Project – Preg, O'Donnell – MOL COMFORT Sinking

Client – Preg O'Donnell & Gillett LLP

Date: April 14, 2015

Deposition Testimony

PROJECT No. 3431

Name of Project – Larson, King – Dugas Asbestos

Client – Larson King LLP

Date: February 2, 2015

Deposition Testimony

PROJECT No. 3241

Name of Project – Squire, Sanders – M.T. Prestige Sinking

Client – Squire, Sanders & Dempsey

Date: February 27, 2013

Trial Testimony – Audiencia Provincial (territorial high court) of a Coruña, Kingdom of Spain vs. Mare Shipping et al.

PROJECT No. 3065

Name of Project – M/V Angeln Capsizing

Client – Brise Schiffahrt

Date: February 5, 2013

Deposition Testimony – U.S. District Court, Southern District of New York

PROJECT No. 3240

Name of Project – Brown Eassa – Winn Asbestos

Client – Brown, Eassa

Date: January 3, 2013

Deposition Testimony